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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/981,900	10/18/2001	Masomeh B. Sticklen	MSU 4.1-539	9143

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EXAMINER

KALLIS, RUSSELL

ART UNIT	PAPER NUMBER
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1638

DATE MAILED: 12/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/981,900

Applicant(s)

STICKLEN ET AL.

Examiner

Russell Kallis

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 November 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15, 17, 47-61, 63-79, 81, 82, 100, 102 and 103 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15, 17, 47-61, 63-79, 81, 82, 100, 102 and 103 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 May 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/08/2004 has been entered.

Rejection of Claims 1-17, 47-82, 100, 102 and 103 under 35 U.S.C. 112, first paragraph, written description and enablement is withdrawn in view of Applicant's amendments.

Claims 16, 18-46, 62, 80, 83-99, 101 and 104 are cancelled. Claims 1-15, 17, 47-61, 63-79, 81-82, 100 and 102-103 are pending and examined.

Claim Objections

Claims 2-6, 48-52 and 66-70 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The dependent claims either refer to sequences without a sequence identifier or recite the sequence identifier already recited in the parent claim.

Priority

Applicant's claim for domestic priority under 35 U.S.C. 119(e) is acknowledged. However, the provisional application upon which priority is claimed fails to provide adequate support under 35 U.S.C. 112 for claims 1-15, 17, 47-61, 63-79, 81-82, 100, 102 and 103 of this

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application. Provisional application 60/242,408 has no filed claims or a specification that sets forth the invention of the instant claims.

Claim Rejections - 35 USC § 103

Claims 1-15, 17, 47-61, 63-79, 81-82, 100, 102 and 103 are rejected under 35 U.S.C.

103(a) as being unpatentable over Himmel M. *et al.* U.S. Patent 6,013,860 issued January 11, 2000, in view of Crawford *et al.*, U.S. Patent 5,200,338 issued April 6, 1993; and in further view of de Boer, H. *et al.* Gene, 1987, Vol. 60; pages 93-102 and Applicant's admission of the prior art.

Applicant broadly claims a transgenic plant comprising a DNA encoding a cellulase (SEQ ID NO: 4, 6, 8, or 10) and a ligninase (SEQ ID NO: 11 or 13) targeted for expression to a plastid or apoplast and which degrades lignocellulose when the transgenic plant is ground and a method thereof.

Himmel teaches methods of engineering of plants to reduce the content of cellulose into fermentables in a plant by expressing lignocellulose degrading enzymes (i.e. a cellulase enzyme) in the plastid (column 1, line 61 to column 2, line 63) and plants thereof; tobacco transformation in column 9, and incorporates through reference U.S. Patent 5,536,655 that teaches SEQ ID NO: 4 (column 4, lines 16-36); an alternative method for expression of the cellulase in a plastid by nuclear transformation and targeted expression to the plastid wherein the cellulase encoding DNA is operably linked to a DNA encoding a plastid targeting sequence (in column 4, lines 45-56; and as taught in Applicant's specification on page 23 as GenBank Accession number X07515 (i.e. SEQ ID NO: 1) first made available to the public in Kyoizuka J. *et al.*, Plant Physiol., 1993; Vol. 102 (3), pages 991-1000); and degradation of lignocellulose

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after grinding (see column 11); a *rbcS* leaf specific promoter, a DNA encoding a chloroplast transit peptide, and an antibiotic selectable marker operably linked to a constitutive promoter, incorporated through reference to U.S. Patent 5,576,198 McBride K. *et al.* see Columns 5 and 4 and figure 1.

Himmel does not teach a ligninase or using a ligninase to better degrade cellulose, or sexual fertilization of two transformed plants producing a third transgenic plant comprising a heterologous ligninase and cellulase.

Crawford teaches the removal of lignin from lignocellulose in order to better degrade cellulose (column 1, lines 38-54) and the identification of polynucleotides encoding ligninases from *Phanerochaete chrysosporium* incorporated through reference (column 2, lines 41-44; Zhang *et al.* Biochemical and Biophysical Research Communications; 1986, Vol. 137: pages 649-656).

De Boer teaches CLG4 i.e. SEQ ID NO: 11, a ligninase from *Phanerochaete chrysosporium* also known as H2 and *ckg4* (specification page 25, lines 24-30; see attached sequence report). Further, Applicant admits that methods for converting lignocellulose in a plant material to fermentable sugars were known in the art on pages 3-4 of the specification; incorporates through reference a plastid signal peptide sequence of SEQ ID NO: 2 from a *rbcS* gene of SEQ ID NO: 1 (GenBank Accession X07515) on page 23 of the specification; and teaches on page 37 of the specification that the *bar* gene from *Sterptomyces* encoding phosphinothricin acetyltransferase is well known in the art as a selectable marker.

It would have been obvious at the time of invention to modify the invention of Himmel to include a ligninase. One of skill in the art would have been motivated by the knowledge common

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in the art that ligninase gene products are valuable materials for breaking down lignocellulose into fermentables as taught by Crawford and Himmel and that ligninase genes and promoters and DNA encoding transit peptides were available in the art as taught by de Boer and Applicant's specification, that one would have had a reasonable expectation of success of selecting transformed plants using *bar* and of expressing genes in transformed plants and plant cells; and wherein sexual fertilization as a method of combining two transgenes into one plants is an obvious design step given the lack of criticality.

Applicant asserts that none of the references suggest combining the specific cellulase and ligninase genes in a single plant and that the combination is based upon hindsight reasoning (response page 20 last paragraph). Applicant's arguments filed 11/08/2004 have been fully considered but they are not persuasive.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, One of skill in the art would have been motivated by the knowledge common in the art that ligninase gene products are valuable materials for breaking down lignocellulose into fermentables as taught by Crawford and Himmel and that ligninase genes and promoters and DNA encoding transit peptides were available in the art as taught by de Boer and Applicant's specification.

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In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). Further, it is noted that Applicant has taught nothing more than what is taught in the art and since there is no teaching of unexpected results, the specification appears to be prophetic.

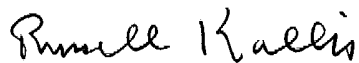
All claims are rejected.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Russell Kallis whose telephone number is (571) 272-0798. The examiner can normally be reached on M-F 8:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amy Nelson can be reached on (571) 272-0804. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in cursive script that reads "Russell Kallis".

Russell Kallis Ph.D.
November 28, 2004